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EUROPEAN MARKET

2019 ANNUAL REPORT

The conversation surrounding the advancement of the built environment has become increasingly global in nature. Learn about the construction landscape in Europe, and the technical innovations happening in machine learning, automation, and the funding backing it all. Compare the similarities and differences between the European and American markets.

Table of Contents

01. Introduction 3

02. European Market Overview 4

03. European Industry Leaders 5

- Bouygues Construction
- Consolidated Contractors Company (CCC)
- Jones Lang LaSalle (JLL)
- Royal BAM Group (BAM)
- VINCI Construction

04. European (Global) Investors 11

- CEMEX Ventures
- Concrete VC
- Foundamental
- Leonard by VINCI
- XAnge

05. Leading Built Tech Companies 17

06. Emerging Built Tech Companies 19

07. Global Summit Key Takeaways 20

08. Conclusion 25

Introduction

BuiltWorlds' Global Summit in Paris, France brought together industry leaders, innovators, and disruptors from all corners of the European market. Through a series of keynotes, panels, and conversations, we got a full look at the lay of the land in Europe as it relates to the built environment, technology development, and innovation in practice.

Our team had the opportunity to visit some of France's biggest construction companies, including construction conglomerate **Bouygues**, one of the country's largest contractors, and **Leonard**, **VINCI**'s open innovation arm. These visits, in tandem with the insights gained from the Summit's impressive line-up of speakers, provided a firsthand account of how each player within the built industry operates in the European market.

In this report, we'll distill each of our key findings from our European travels, from understanding similarities among some of the most innovative industry titans to the biggest takeaways from our Summit in Paris. There are certainly differences between the European and U.S. markets and we're here to help you navigate the workings of one of the most complex industries in the world. We'll parse those differences, and give you our read on the status of the built world across the pond.

European Market Overview

The city of Paris--and the urban development that morphed it into the boulevard-lined metropolis it is today--is a perfect demonstration of the most significant distinctions between the European and U.S. markets.

To understand the layout and architecture of modern Paris, you must first travel back to the 19th century, when the City of Lights experienced its enormous population boom.[1] Residents crammed themselves into tiny neighborhoods and buildings, and disease was rampant.

In 1848, Louis-Napoleon Bonaparte (later Napoleon III, nephew and heir of Napoleon) returned to Paris following a series of failed coups and exile to London. Disgusted by the city's overcrowding and filth, especially compared to the more advanced and developed London, Napoleon sought to turn Paris into a clean, modern city.[2]

After being elected President, Napoleon III appointed Georges-Eugène Haussmann to oversee the "renovation" of Paris. This controversial overhaul saw the demolition of entire neighborhoods and the construction of the city's iconic apartment buildings and wide avenues. Funding for this costly project was done through the creation of several corporations and financial institutions, including **The Credit Foncier** and **Caisse Nationale de Travaux Public**. Additionally, newly-developed funds, like the **Credit Mobilier**, financed Hausemann's sweeping vision in exchange for the full development rights of certain avenues and boulevards.[3]

This massive project transformed Paris into the city that it is today demonstrating a crucial function of the European construction industry that holds true even today: the cooperation between the government and private sector to build out infrastructure. In modern France, the government continues to collaborate with huge, multinational companies like Bouygues, **Effiage**, and VINCI for the construction of the country's most important buildings and infrastructure projects. Traveling throughout the country, you can see so many construction projects with signs touting one of these select few contractors who regularly do work on the country's esteemed infrastructure assets.

This is in complete contrast to the United States, which is home to thousands of contractors--from large players like **Bechtel** and **Turner**--to smaller outfits, which tackle interior and renovation projects. True to the entrepreneurial (and individualistic) American Spirit, there is very little collaboration between these contractors and the government unless absolutely necessary.

European Industry Leaders

Belgium
- Besix

England
- Balfour Beatty
- The Royal BAM Group (BAM)

France
- Bouygues
- Eiffage
- Saint-Gobain
- Spie Batignolles
- VINCI Construction

Germany
- Bosch
- Heidelberg Cement
- Hochtief
- Knauf
- Hochtief
- Knauf
- Peri Formwork

Greece
- CCC

Liechtenstein
- HILTI

Portugal
- Grupo Casais

Spain
- Acciona I'MNOVATION
- Cemex
- Ferrovial Agroman
- Grupo ACS
- Sacyr

Sweden
- Skanska
- Volvo Construction Equipment

Switzerland
- Liebherr Group
- SFS Group
- Sika AG

U.S.
- Jones Lang Lasalle (JLL)

Source: BuiltWorlds

European Industry Leaders

Throughout Europe, there are industry players who work to erect the infrastructure and buildings throughout the continent. Many of these players are large, multinational operations that work across the globe with some specifically operating in Europe, alone. Yet, one major theme that cuts across each of these players is their collaboration with governments. This goes far beyond P3s (private-public partnerships). As noted above, the governing bodies of Europe are incredibly involved in the development of construction and infrastructure projects. We highlighted five particularly interesting companies and chronicled some of the specific projects where they worked with various European governments to prove this point.

Bouygues Construction

Bouygues is one of the single largest companies in France, employing a whopping 129,000 employees across 90 countries. Beginning as a construction company in 1952, Bouygues has since diversified its portfolio to include real estate development, media, telecommunications, and transportation. Its construction vertical, Bouygues Construction, has 56,981 employees in over 60 countries, working on a wide array of projects ranging from bridges to office buildings.[4]

The company is dedicated to innovation and integrating new technologies on its projects. Beginning in the early 2000s, Bouygues began using BIM models on some of its projects. Since then, the company has leveraged the technology to complete some high-profile projects, including the Paris Philharmonic, the Singapore Sports Hub, and the Abidjan Bridge. Today, BIM is required in all of Bouygues' sales offers.

Over the years, Bouygues had a hand in countless iconic projects such as the Satde De France, home to the country's national soccer teams. Bouygues' public works sector makes up a substantial part of its work, accounting for about one-fourth of its total orders and 16 percent of its sales.[5]

Case Study: L2 Marseille Bypass[7]

In 2014, Bouygues was awarded a €620 million contract to build a bypass road around the city of Marseille, France in an effort to decrease congestion.[6] The contractor built 10.5 km (about 6 ½ miles) of toll-free expressways linking the A7 motorway to north Marseille and A50 to the eastern part, conveniently naming the project the L2 Marseille Bypass for its two distinct stretches. The project was a result of a 30-year public-private-partnership (P3) between Bouygues and the French Ministry of Ecology, Sustainable Development, and Energy.

Finished in 2017, the project exemplifies the efficient collaboration between a government and a private company. The French Ministry of Ecology, Sustainable Development, and Energy financed all facets of the project including, design, construction, and maintenance of the bypass. Bouygues remains responsible for the regular upkeep required on the roadways. Given its vast coverage, the project has also opened up the potential for the development of numerous public transportation projects in the surrounding area.

CCC

Founded in 1952, **Consolidated Contractors Company (CCC)** is the largest construction and engineering firm in the Middle East (headquartered in Greece). Staying involved in every phase of a project's lifecycle is critical to CCC's strategy, as they offer pre- to post-construction services and support. CCC's 110,000-plus employees work in more than 50 countries and across several construction segments, including, transportation, sports facilities, power and energy, water and wastewater infrastructure, industrial, pipelines (oil, gas, and chemicals), buildings, and more. In 2017, CCC generated more than $5.69 billion. In the past 5 years, 30 percent of CCC's sales have been from their heavy civil projects, and 23 percent of all sales have occurred in the UAE.[8]

Launching a full R&D initiative in 2017, innovation is now core to CCC's progress, and has taken shape in a number of ways. The digital transformation of construction and engineering through the utilization of BIM is a major trend we have seen here at BuiltWorlds. CCC is utilizing BIM for project control strategy to integrate scope, progress, cost, and quality control into a single digital format to predict and address disruptions in the construction process. CCC has also placed a major focus on 3D printing, and is currently piloting the technology on a demo unit to demonstrate its full capabilities. To address sustainability challenges, CCC is developing off-grid, solar-powered accommodation units for their own workforce in order to combat extremely high temperatures.[9]

Case Study: Sports Hall at Khalifa Sports City (Aspire Dome)[10]

In November of 2005, the Sports Hall at Khalifa Sports City (Aspire Dome) in Qatar was inaugurated and officially opened. The 112,000 m^2, 46-meter high Sports Hall is comprised of two main sections, which contain several different sporting courts, gyms, fields, and an aquatic complex, lecture halls, dormitories, laboratories, and medical centers. Designed by famed French architect Roger Tallibert, the sports hall is the "largest air-conditioned indoor facility of its kind under an architecturally unique edifice consisting of two semicircular shells" and seats more than 15,000 people. The development of the complex was due in part to Qatar's Supreme Education Council's effort to identify top talent in their state-funded independent school system and their Supreme Committee for Delivery and Legacy, which is working to ensure positive lasting effects of their sports facilities following their hosting of the 2022 FIFA World Cup.

Jones Lang LaSalle (JLL)

Jones Lang LaSalle (JLL) is a global commercial real estate firm based in Chicago. With global revenue of $16.3 billion and over 90,000 employees working in 300 offices across 80 countries, JLL is one of the largest brokers of commercial real estate assets--be it land, buildings, or offices. While it is headquartered in BuiltWorlds' backyard, JLL has a massive presence in Europe, including Spain, France, and most notably the UK. Not only does the company broker some of the country's biggest commercial real estate deals, but it is also involved with the development, construction, and refurbishment of its assets.[11]

As a global leader, JLL is always using innovative practices in its litany of services. In particular, it has taken substantial strides in the realm of sustainability. According to the company's annual Global Sustainability report, JLL has assisted clients in receiving 254 sustainable building certifications, covering over 98 million of floor space.[12] 39 percent of the company's own offices have a sustainability certification, and JLL plans to increase that number to 100 percent by 2030. The company is focused on mitigating the risks of climate change and is adopting a Taskforce of Climate Change - Financial Disclosure framework.

Case Study: Cheshire Site Underground Observatory

In early 2019, JLL worked with the British Geological Survey to successfully get approval from the Chesire West and Chester Council to develop the UK Geonergy Observatory at Ince Marshes, Cheshire. The undertaking involves 50 holes drilled 3,937 feet into the land for the installation of £2.5 million worth of sensors designed to measure how the earth below the surface functions. This will give scientists an unprecedented glimpse at the chemical, physical, and biological works of the earth at that level. With this project, JLL successfully collaborated with a UK government agency to accomplish a groundbreaking land deal. All the information and data collected will be free to the public, and published online. This is a great example of a property developer working hand-in-hand with a government for an important public works project.

The Royal BAM Group

The Royal BAM Group (BAM) was established in 1869 in a small village just east of Rotterdam, Netherlands. What was once a small carpentry business that specialized in windmill repair and the building of coffins, has now grown into one of the largest construction and engineering companies in Europe. Employing more than 20,000 people and generating more than €7 billion in revenue in 2018 alone, BAM has 10 operating companies that work in two business lines: (1) Construction & Property and (2) Civil Engineering.[13] One BAM subsidiary, BAM International, is active in 30 countries, working in markets such as government, industrial, infrastructure, mining and minerals, oil and gas, and ports and terminals.

An emphasis on digital construction and sustainability has been major a factor in BAM's positioning as a leader in the European market. BAM has several initiatives to improve their own environmental performance and enable more energy-efficient buildings and infrastructure. The company will plant 150,000 trees in 2019, which aids in reaching their goal of having a net-positive climate impact by the year 2050. BAM has also embraced several of the cutting-edge technologies and innovative practices in several of their projects, creating a greater connection from the initial digital design concept to construction. The company utilizes augmented, mixed, and virtual reality to experience a finished project before it's even constructed. It has used the **Microsoft** Hololens on the jobsite to provide critical information and instructions to the their workers, ensuring the work is being completed correctly and safely. Additionally, 3D printing, robotics, scanning, BIM, and offsite construction all play major roles in BAM's digital construction initiatives.

Case Study: Ijumiden Sea Lock[14]

BAM PPP was formed in 2006 following Royal BAM Group's continued success in public-private partnerships. With more than 90 employees in 6 different offices, BAM PPP provides services and support to ensure the success of PPPs across several different markets. One project in which it is involved is in the replacement of the northern lock Ijumiden at the port of Amsterdam. A joint venture with Netherlands-based construction company **VolkerWessels**, the new sealock has a capital value of €346 million and will be 70 meters wide, 500 meters long, and 18 meters deep. The new sea lock will be able to accommodate more ships, and will create safer navigation throughout the port greater opportunity for local economic development. The duration of the contract is 26 years, and the new lock is to be completed by the end of 2019.

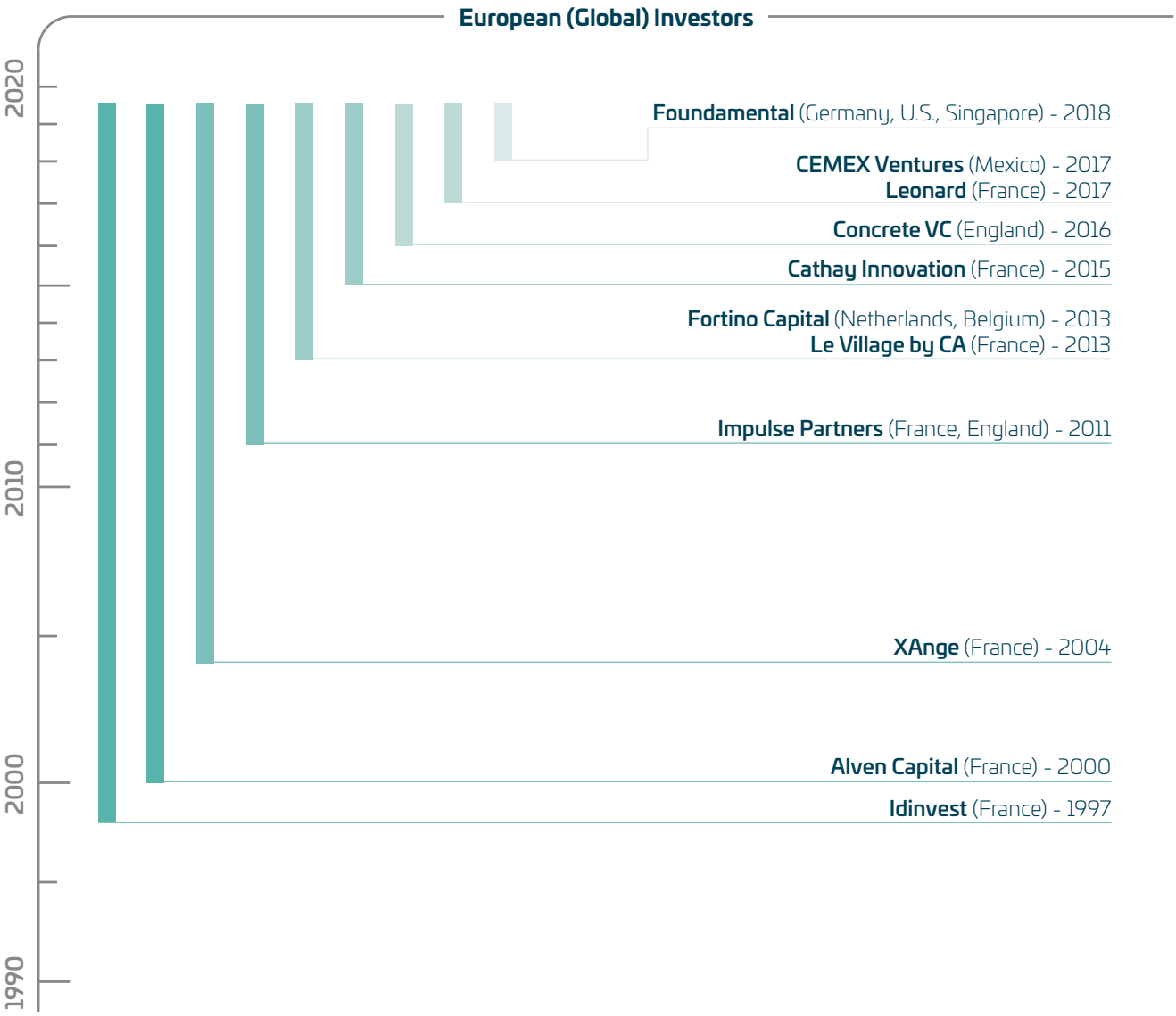
VINCI Construction

As an investor, builder, and operator of buildings and infrastructure, VINCI is yet another major player based in France specializing in airports, railways, highways, stadiums, and other city-scale projects that have enormous impacts on urban mobility. In 2018, VINCI Construction generated more than €14.2 billion of the company's total revenue. Employing more than 211,000 employees across 3,200 business units, 270,000 jobsites, and 119 countries, VINCI generated €43.5 billion in revenue in 2018 alone. Of that, 43 percent of their revenue was generated outside of France, with around 7 percent of their international revenue coming from the Americas. This aligns with VINCI's goal to generate more than 50 percent of their total revenue outside of France within the next few years.[15]

With more than €50 million devoted to R&D yearly, around 50 research programs in 12 collaboration hubs, and an active patent portfolio of around 3,300 patents, VINCI has innovation and technological progress rooted in its DNA. One such program is Leonard, an open laboratory developed to support the future of cities and infrastructure through innovation in autonomous vehicles, construction technology, urban resilience, and much more. Another initiative sponsored by VINCI is La Fabrique de la Cité, a think tank dedicated to urban innovations that gathers French and international stakeholders to reflect on new ways to build and rebuild cities.[16]

Case Study: South Europe Atlantic High Speed Rail Line[17]

One of VINCI's most high impact projects is the South Europe Atlantic High Speed Rail Line (SEA HSL), which was commissioned in July of 2017. VINCI Concessions was awarded the project in 2011 through its subsidiary LISEA, which has assumed all risk through concessions' end in 2061. Connecting Paris and Bordeaux, France by just over 2 hours, the rail line has played a major role in increasing the appeal of the region. In 2018 alone, the SEA HSL transported more than 20 million passengers and improved traffic along the route by 20 percent. Aside from using innovative solutions for the operations and maintenance of the SEA HSL, leaders are working on initiatives to protect the environment near the line and supporting community development along the route. As a true P3, LISEA is partnering with local authorities to monitor and report on the socio-economic impact of the areas surrounding the SEA HSL.



Source: BuiltWorlds

European (Global) Investors

The built industry is at a time of incredible growth. For so long, construction companies, real estate firms, architects, and engineers were resistant to technology, and fell far behind other fields like the entertainment, hospitality, healthcare, and manufacturing industries. Now, a new page is turning. Adoption of technology solutions to accomplish a variety of tasks both in the office and the field has increased drastically around the globe and it's exciting to see. With the thousands of construction technology, PropTech, and UrbanTech solutions, it is clear that the demand is growing. Yet, with any great landscape of innovation, there is a slew of investors at the ready to provide funding, connections, and industry expertise. Let's dive into five of the leading traditional investors, corporate venture capitalists, and accelerators changing the world of European and global innovation.

CEMEX Ventures

As the corporate venture capital arm of **CEMEX**, a multinational building materials company based out of Mexico, **CEMEX Ventures** looks to invest in startups innovating across six distinct areas: smart cities & buildings, project design & engineering, supply chain management, project & jobsite management, innovative building materials & construction methods, and investment & financing. Startups inducted into CEMEX Ventures' portfolio are given access to capital, pilot programs, test markets, advisors, and important resources from CEMEX (marketing, office space, and R&D). While CEMEX Ventures is a corporate investment arm, it really aims to help startups from all over the industry, tackling all sorts of problems beyond building materials.

Key Facts

Founded Date:
2017

Headquarters:
Mexico, Spain

Investment Stage:
Early Stage Venture, Seed

Founder/Head:
Gonzalo Galindo

One of the most exciting aspects of the investment arm is its Construction Startup Competition, which is now in its third year. Previous winners include IPSUM, collaboration platform based around Lean-BIM technology, and Prysmex, a solution mitigating accidents on jobsites. These two previous winners are now part of the CEMEX Ventures investment portfolio or have received an offer and continue to make an impact within the construction industry.

Interesting Investment:

At the tail-end of 2018, CEMEX Ventures announced it was leading a $1.5 million seed-round of funding for **StructionSite**, a startup working to create digital twin models of buildings through the use of 360-degree cameras.[18] This truly highlights CEMEX Ventures' overall commitment to finding construction technology investments that push the entire industry forward, rather than simply focusing on their parent company's specific needs.

concrete

Concrete VC

Hailing from London, **Concrete VC** is the result of a braintrust composed of **Seedcam**, **Nuveen**, JLL, **Lockton**, Vinci, **Segro**, **FORA**, **Clifford Chance**, and **Hammerson**. Concrete VC specifically makes minority seed and series A investments into companies that are doing work with the open innovation platform's investment partners: **Starwood Capital Group**, **JLL Spark** and **U+I**. Unlike a lot of funds, Concrete really hones in on PropTech solutions based in Europe and the EU. With a start-studded cast of investment partners and advisors, Concrete VC is able to provide its startups with unique access to leaders in the real estate field.

Key Facts

Founded Date:
2016

Headquarters:
England

Investment Stage:
Early Stage Venture

Founder/Head:
Taylor Wescoatt

When it comes down to Concrete VC's core investment principals, the firm is looking to invest in the journey of some of the most exciting early-stage startups, make sure that connections form the backbone of all relationships, and those connections are backed by industry expertise across all RE segments

Interesting Investment:

Last year, Concrete VC invested in **OpenSensors.io**, a software designed to track occupancy levels in offices and make space management more efficient. This helps building owners make intelligent decisions about their properties, cuts costs, and map out occupancy. The firm also took part in the series B of sustainability data company, **Measurabl**, which took in nearly $26 million in funding just last year.

Foundamental

With a global presence and offices in San Francisco, Berlin, and Singapore, **Foundamental** has proven its commitment to innovation crossing construction markets and borders. Backed by building materials limited partners with 60,000 experts in 60 markets, Foundamental brings industry expertise to a market segment flooded with new technology.

Key Facts

Founded Date:
2018

Headquarters:
Germany, Singapore, U.S.

Investment Stage:
Early Stage Venture

Founder/Head:
Patric Hellermann

Foundamental operates on the core belief that the construction industry will become an orchestrated economy powered by autonomous supply chains across one of three digital assets: fulfillment, protocols, and intelligence. As such, the firm is looking to help their portfolio companies become those orchestrators of the industry, truly driving industry-wide process change. Foundamental brings deep insights and access across the globe to help in this goal. With an inaugural fund looking to invest in 40 companies by mid-2022 (typically investing at the series A or B round), the firm and its limited partners prioritize bringing access to construction markets and expertise to their portfolio companies. Foundamental has opted for a stealth approach to investing, keeping their value add focused on their portfolio companies.

Interesting Investment:

Though the full inaugural fund may be hidden from the public at the time being, we have seen some standalone investments take place. Foundamental's most notable investments include that of **Mighty Buildings**, a company focused on creating affordable homes for families with highly-automated 3D printing capabilities, and **ALICE Technologies**, an artificial intelligence software charged with accelerating the planning process by reducing project schedules and resolving schedule delays with ease. Two of Foundamental's other investments include **Kagenova**, a company out of England that develops immersive reality technologies for virtual reality, and **HoloBuilder**, a jobsite documenting and progress capturing application.

Leonard

Created by VINCI, Leonard is helping develop solutions for the advancement of cities and infrastructure by providing an open laboratory environment to spur innovation and progress ideas as they relate to the construction process. Those involved focus on trends such as autonomous vehicles, construction technology, urban resilience, to name a few. By enabling their collaborators and partners to explore prospective scenarios, connect with other experts and innovators, and engage with Leonard through coaching, Leonard is providing VINCI employees the ability and encouragement to turn an idea into a business.

Key Facts

Founded Date:
2017

Headquarters:
France

Investment Stage:
Seed, Incubator

Founder/Head:
N/A

When engaging with startups through their Intrapreneurs Program, Leonard assists companies for eight months--four months to move from idea to project and four more months to move from project to business. During this time, Leonard supplies coaching and guidance on how startups can bring their ideas from concept to market, and, in some instances, even invest them. Participants in Leonard's program have the added benefit to work directly with VINCI, if applicable, gaining real world experience and feedback from a leading global player in concessions and construction.

Interesting Investment:

Leonard has a year entrepreneurship program, Acceleration Committee, where VINCI employees present their ideas after four months of development. Earlier this year, the committee's jury awarded another four months of support to four projects: **APPIA**, which optimizes infrastructure layout; **Restore**, which uses algal biomass and biomaterials to captures CO2 emitted by construction projects; **Build In Social Solution**, a project specializing in the maintenance of buildings; and **N'VEREST**, which will produce "innovative kits" for general contractors.[19]

Graduates of the program include **Waste Marketplace**, B2B waste management marketplace connecting jobsites and recycling centers; **Avus Digital**, AR construction software provider enabling workers to avoid injury; and **Resallience**, GIS and critical functional data analysis company focused on enabling infrastructure operators with climate change information.

XAnge

Operating in both Paris and Munich, XAnge is a €450 million fund that began in 2004[20] and has invested in 55 companies throughout its 15 years of existence. A part of the **Siparex Group**, the fund focuses on a variety of startups from different areas of expertise, including software, artificial intelligence, blockchain, environmental solutions, sustainability, housing, open data, and safety. XAnge specializes in investing in early-stage startups and providing access to funding and corporate partnerships, both of which are vital to young startups. With a truly global reach, XAnge brings a robust relationships to the table with corporate partners like **CNP International**, **Bpifrance**, and **Le Groupe La Poste**. Over the years, it has cultivated a reputation of being one of the key innovators in the European market, and has advanced many game-changing companies.

Key Facts

Founded Date:
2004

Headquarters:
France

Investment Stage:
Early Stage & Late Stage Venture, Seed

Founder/Head:
N/A

Interesting Investment:

Citilog is one of XAnge's many success stories. The startup exited XAnge's program and has since gone on to get more funding to expand its business. Predicated on the basis of intelligent transportation solutions, Citilog makes accident detection systems and sensors installed along highways and roads, and provides city officials with valuable data about the flow of traffic and safety of roadways.

Leading Built Tech Companies

The AEC industry is in the middle of an interesting period. Open innovation funds are pouring significant money into construction tech solutions. But this would not be happening if investors didn't see the benefit of these solutions. Technology is being adopted--both on the jobsite and in the office--at an increasing rate. While the built industry is certainly behind other fields, it is catching up. Below, you'll find a list of leading and emerging built tech companies ranging from established players to those in the middle of raising seed capital. We profiled the biggest, most influential companies, and put together a list of other emerging solutions making waves in Europe. Regardless of size, these players are pushing the AEC industry forward and bringing actual, tangible innovation to users.

You can't talk about major European tech companies without mentioning **ABB**. The Swiss-Swedish giant was born out of a merger between the historic General Swedish Electrical Limited Company, and Brown, Boverie & Cie in 1987. Since then the multinational company operates in over 100 countries and employs about 147,000 people. ABB organizes itself into five distinct business focuses: electrification, industrial automation, motion, power grids, and robotics & discrete automation.[21]

ABB's work in robotics has been incredibly exciting to watch as it's developed over the years. The company's robotic solutions cover a litany of industries--from automotive to solar--and do a variety of different tasks. For example, ABB offers a suite of robots dedicated to welding applications. Combined with ABB's automation technologies, these machines can take over menial tasks, and free up workers for more important jobs on projects. The IRB1660 was designed to handle large, heavy weld guns. Meanwhile, the IRB 6620 is a more agile, flexible machine that can work in tighter spaces.[22]

A subsidiary of the **Dassault Group**, **Dassualt Systems** is a French software company headquartered in France. The company primarily develops software solutions for 3D applications and asset lifecycle management. With a total user base of 10 million premise users and 100 million software users, the company produces software for a variety of industries, including construction and infrastructure.[23]

Broadly speaking Dassault Systems' construction solutions fall into three major groups: buildings, infrastructure, and cities. The company's 3DExperience platform provides users in the AEC field with a suite of solutions that will help them visualize their projects and jobsites. The software gives users a single 3D version of truth allowing for real time changes to plans and CAD models keeping stakeholders up-to-date. When it comes to designing for fabrication. 3DExperience also helps users on the fabrication side of things, connecting designers, fabricators, and contractors on a single platform, allowing them to share data and design plans.[24]

Sage began as a small, British startup in 1981, but was listed on the London Stock Exchange with a €20 million valuation only eight years after its conception. The company's 13,000 employees now work with customers across 23 countries to provides solutions for HR, accounting, payroll, payment, assets, real estate, construction, and enterprise systems. Sage works with companies of all sizes, and utilizes the cloud to allow for users' mobility when using their products. With a 6.7 percent recurring revenue growth, Sage continues to position itself as a leader in the space. Sage's global footprint continues to engage users from all over the world, including the United States. In 2018, Sage saw an eight percent organic revenue growth in the U.S., growing their cloud connected revenue by €46 million.

Sage's Enterprise Resource Planning (ERP) system allows companies from several different industries to efficiently leverage important data to optimize long term planning as well as day-to-day operations. Sage's Construction ERP systems helps industry players monitor and manage all of the critical information that comes with the management. WIth several different jobsites and outside stakeholders, utilizing a cloud-based ERP software ensures that the folks in the field and in the back office are on the same page when it comes to sharing important financial information and other impactful data. Sage's ERP software also gives construction companies an inside look on project progress, allowing users to make decisions in real-time.[28]

Siemens was founded as a 10-person company in Berlin more than 170 years ago for the design and manufacturing of an improved electric telegraph. The company's technology solutions have been utilized in some of the world's most historic events, including the Apollo 11 moon landing (where Siemens' technology enabled astronauts to find critical data and other information to ensure safe, efficient touchdown).[25] Now, as a global leader in technology and innovation across several industries, Siemens has almost 380,000 employees and, in fiscal year 2018, generated €83 billion in revenue. As a pioneer in intelligent cities, digitization of infrastructure, and sustainable energy solutions, the technology giant has been influential in driving the conversation on the advancement of our buildings and infrastructure through innovative practices and technology adoption.

Siemens provides a number of products and services aimed at creating safer and more energy efficient buildings and infrastructure, including their Total Energy Management approach to reducing carbon footprints[26]. With a goal of being the first major industrial company to have a net-zero carbon footprint by the year 2030, Siemens is turning to on-site energy production while changing its energy consumption methods and practices. Not only is it applying this approach to its own buildings and infrastructure, but it is helping its clients follow the same steps to become more energy efficient. This is being achieved by constant data analyses, utilizing sensors and cloud-based technologies, finding new ways to supply energy to their buildings, and more.[27]

Emerging Built Tech Companies

AEC Selection, Bid Management, Invoicing

Because Architecture Matters (France)
Built-ID (England)
Cosuno (Germany)
Roobeo (Germany)
Toltec (France)

Field/Site Monitoring Scanning/IoT

Converge (England)
FunBim (France)
Imerso (Norway)
Meero (France)
Qflow (England)
Sitemark (Belgium)

Machines, Robotics, 3D Printing, Equipment Management

Actimodul (France)
KEWAZO (Germany)
MX3D (Netherlands)
Scaled Robotics (Spain)
Sculpteo (France)
ToolSense (Austria)
XTreeE (France)
CAD.42 (France)
LINKX (Spain)
Vemcon (Germany)

Modeling & Visualization Software

BIM&CO (France)
BIMCHAIN (France)
BIM Launcher (Ireland)
Bloc In Bloc (France)
Snapkin (France)
Spaceti (England)

Planning & Design

Buildrz (France)
KANDU (France)
Habx (France)
nPlan (England)
OpenAsset (England)
Spacemaker.ai (Norway)
Urban Intel (England)
OpenSensors (England)

Smart Buildings, Products, Materials & Systems

Allthings (Germany)
Hydrellis (France)
meo Energy (Austria)
Performance BioFilaments (Germany)
Pod Point (England)
Raybased (Sweden)

Project Collaboration & Analytics Software

Alasco (Germany)
BulldozAir (France)
Capmo (Germany)
Contilio (England)
FINALCAD (France)
Keepsite (England)
LetsBuild (Copenhagan)
Perfony (France)
PlanRadar (Austria)
Resolving (France)
Siryus (Switzerland)
thinkproject (Germany)

Real Estate

Beekin (England)
Bien'ici (France)

Workforce

Molteo (Germany)
Journeyman (Germany)

Global Summit Key Takeaways

At BuiltWorlds Global Summit in Paris, we heard from some of the industry's biggest players and innovators. It was a great event, and really put a lot into perspective for both the BuiltWorlds team and our attendees. We really appreciated all our speakers' willingness to share their insights and facilitate this conversation. Below are eight of our key takeaways from the three days of programming.

1 Hilti's BIM Competence Center aiding in industry BIM training and adoption.

In an effort to continue to educate the industry on the benefits of BIM utilization during all phases of the construction process, **Hilti** created a BIM Competence Center where the company's BIM specialists can help industry players implement and utilize more detailed modeling on their projects. BIM is frequently used during the planning of pipes and ducts, but often the MEP supports are not included in the model. During the Summit, Daniel Gmeiner, Hilti's leader of the BIM Competence Center discussed why it is important to offer BIM training and other services to industry players. Gmeiner explained that for quite some time there has been missing BIM workflow adoption for critical aspects of the preconstruction process. He hopes that Hilti's efforts can help industry players take a more efficient, organized approach to leverage detailed BIM models that host critical information.

2 Robots are having an increased role on the jobsite.

Erin Bradner, Director of Robotics at **Autodesk**, sat down with BuiltWorlds' Jim Lichtenwalter to discuss what Autodesk's R+D teams are doing to explore and de-risk tech investment for their customers. The discussion focused on the increased opportunities for robotics in construction due to advances in machine learning and proliferation of sensors that are allowing robots to sense, plan, and act increasingly on their own. Robotics are being utilized to perform actions like materials handling, overhead lifting, and other labor-intensive, repetitive tasks to address workforce shortages, unsafe working conditions, and other challenges that workers face when put in high-risk environments. Moving forward, Bradner doesn't necessarily think there will be a single all-inclusive robot, but, instead, there will be several smaller robots that can accomplish specific tasks.

3 Offsite construction continues to draw interest & focus.

BuiltWorlds recently released our **2019 Modular Construction Update Report** in which we detailed some of the major benefits and challenges of modularization, the relevant industry and technology players around offsite construction, and the general interest and momentum that it has generated just in the past year. This sentiment was definitely felt throughout our Global Summit, but especially during our Future of Construction and Development panel.

Similar to our discussion regarding robotics in construction, finding ways to apply manufacturing techniques to construction to cut waste and make projects more efficient has become a major focus in our industry. Pedro Lopes, Innovation and Knowledge Coordinator at **Grupo Casais**, explained how the company has recently opened their own modular manufacturing facility to address these challenges. U.S.-based construction company **Skender** has done the same with their own manufacturing facility in Chicago opening earlier this year. However, while offsite construction does address key challenges that industry players face every day, other concerns surrounding design, materials, and supply chain management have become more relevant.

4 You can utilize tech to eliminate waste in materials transportation & delivery.

So many of the challenges that the construction industry faces stem from the handling of materials. From transportation conflicts that can impact project schedules to the on-site waste that so frequently is generated from building materials, utilizing a logistics analytics platform can help prevent the problems surrounding material misuse and mishandling.

Kicking off our Global Summit, Gonzalo Galinda, President of CEMEX Ventures, facilitated a conversation with several key stakeholders in the construction process about utilizing technology to improve the movement of materials to, from, and around the jobsite. A large part of the group's discussion centered around having 'prescriptive' analytics platforms rather than 'predictive' analytics in order to more effectively leverage the data collected during construction. However, the group noted that the construction industry currently only has access to 'predictive' analytics platforms, implying that more efficient logistics platforms are yet to arrive.

5 Vertical integration is key in housing development, design, fab shops, and architecture firms.

One of the largest differences the BuiltWorlds team noted between the American and European markets centered around the interaction and relationship between different stakeholders throughout an entire project's lifecycle. Vertical integration of key project stakeholders into massive, consolidated groups is an approach that companies like Bouyuges, VINCI, and Grupo Casais, have taken advantage of.

Having dedicated teams all in-house for all phases (from development & design to asset turnover) of a project allows for greater stakeholder transparency, quicker and more efficient communication between project teams, and an otherwise more positive experience for clients. While more and more U.S. companies have made efforts to become vertically integrated, projects in the American market at large are still a disparate, fragmented collection of several stakeholders.

6 Intrapreneurship is pushing the industry forward.

We were lucky enough to have Julien Bourcerie, Head of Open Innovation at Bouygues Construction, deliver the keynote about Bouygues Construction's approach to inspiring innovation within their company. Julien's role as Head of Open Innovation is to work with employees within their organization to conceptualize a solution, develop it, and take it to market.

The massive amounts of time and resources dedicated to R+D and in-house encouragement to pursue new ideas was certainly a difference we noted between the major European players and the American companies in attendance. While we often see companies test or pilot new technologies on their jobsites and within the organization, it was interesting to see the support (both culturally and financially) by major industry players to shift their focus from an employee's day-to-day job toward developing new ideas and solutions. It was easy to identify these companies' commitment to developing and utilizing solutions to improve their own organizations and aid in their employees' growth.

7 The importance of data in the IoT & digital twin solutions.

In a panel on the innovations we are seeing in building technology, Jamie Roche, CEO of **Helix.re**; Shriant Sharma, Head of Smart Space at **BuroHappold Engineering**; and Julien Daclin, Digital Sustainability Directory at JLL had a lively conversation about the role data plays in IoT and digital twin technologies. There was some conversation about the disconnect between the optimism of IoT (and how it actually help users) and its actual, practical use. Roche said he believes that the industry has a way to go to actually before IoT solutions provide the level of insight users are demanding.

The conversation then turned to the use data in these solutions. Building owners are collecting all sorts of data on their spaces and tenants. All three panelists pointed out that collecting data is great, but it really isn't helpful unless it's put into context and actually used for insightful purposes. Sharma, Daclin, and Roche all talked about how important data protection is. While in America (where Helix is based) this topic is of the utmost importance. While it's very important in Europe, data privacy isn't put on the pedestal that it is in the States.

8 Open innovation looks very similar in Europe and the U.S.

In the United States, the heart of the venture financing industry is in Palo Alto. But in Europe, there is no one location leading the charge. In a panel examining European open innovation platforms, Gonzalo Galindo, Head of CEMEX Ventures; Rani Saad, Managing Partner at Foundamental; and Guillaume Bazouin, Head of Startups and Open Innovation at Leonard talked about the differences between their funds, and what success looks like to each of them. This varied, as each investor has a different focus and invests in different types of companies. Guillaume focuses on early-stage companies that are just getting off the ground, while Rani focuses on solutions with a deep technology focus.

While there are certainly some small differences between the state of the venture industry in Europe and the United States, the panelists all commented that there are a lot of things that are actually the same. Namely, the industry is in a time of great excitement. The extreme interested from open innovation funds we've been seeing in construction technology and infrastructure solutions in the United States is similar to the excitement in Europe. Many solutions are being created, and investors and strategic corporate arms are pouring capital and resources into them. All three panelists agreed that we're likely to keep seeing this period of growth continue in the coming years.

Source: https://www.theworldisabook.com/27260/tips-for-visiting-and-going-up-the-eiffel-tower-with-kids/

Conclusion

One of the greatest sights in Paris is from the top level of the Eiffel Tower looking east. The city is spread out below, the uniform buildings stretching seemingly endlessly in all directions. The Seine marches through the middle of the view, with Notre Dame standing resolutely in the middle of the flowing river, and the Louvre stretches out languidly along the northern bank. It's a breathtaking sight, and gives the viewer an eagle-eyed perspective of the City of Lights.

Standing over Paris, it's easy to understand why writer Ernest Hemingway famously wrote: *"If you are lucky enough to have lived in Paris...then wherever you go for the rest of your life, it stays with you, for Paris is a moveable feast."*

Looking out, what's most remarkable is how this beautiful city was essentially reinvented almost 200 years ago through a collaboration between the government and private business. Without Haussmann and his controversial renovation--and the businesses that funded the 30-year venture--there would be no wide avenues dotted with stores and cafes, no rows of uniform, iconic apartment buildings lining the streets. To think about Paris without that infrastructure project is to think of an entirely different city. While not many cities in the United States were developed in such a manner (especially many of the larger urban centers), that doesn't mean we can't learn something from Europe.

Despite the differences and tweaks that punctuate much of Europe's built world, the BuiltWorlds team was struck by the similarities we saw. As we've alluded to many times in this report, the AEC industry is in a period of great change. Whether you're working in the City of Lights or the Windy City, you face the same hurdles, see the same trends, and have success in the same fields. As Earth's population continues to balloon, we need to build smarter and faster. The only way we can do that is if we have honest, frank conversations, share with one another, and move this industry forward as a whole, step-by-step.

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Endnotes

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